DETECTING MIS-INFORMATION ON SOCIAL MEDIA USING MACHINE LEARNING

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Abstract : Due to social media people are becoming more exposed to the fake news. It promotes the spread of negativity in the society. Thus fake news detection is becoming one of the major part of the IT industry. Fake news Detection is the non-trivial task, which requires multi-source information such as news content, social context, and dynamic information. Fake news cannot be detected simply based on news contents. In addition to news content, user engagement and social behaviour should also be explored. For example a credible users signal that "this is a fake news" is enough to determine the authenticity. Certain other information like social behaviour of news , the way it has been used by user etc are also important factors. Thus Dataset which contain news content, social context and dynamic information could help in fake news detection. So In our system we provide a way to user in which fake news can be detected. The system uses data mining which provides a way to user to easily detect fake news by using various data mining algorithms

IndexTerms **- news , Mis-Information ,Fake-News Dataset, Detection, Machine Learning Algorithms.**

I. INTRODUCTION

As Increase in impact of Social Media is increasing day by day. One cannot hide the fact the way it can be mishandled. The growth rate of user in social media is increasing tremendously. Which raises the question how can we check the authenticity of user?. And also raises the question whether the user is sharing the right information or not?. And as the impact of social media is increasing it is becoming an medium through which fake news can be easily propagated. The after effects of the fake news or mis-information can be really worse which may result in great loss of intelligence and also sometime lead to wars. It can also have impact on individuals life and it may also lead to harming the society. The issue of mis-information came into limelight during the 2016 US elections where fake news was spread with intention of exploiting the other parties image . The lies were created and they were spread as the facts to the people. The major social media platform which were used to spread the fake news were Facebook and twitter. Several investigation were created and the main purpose was to found about the source through which these facts were being shared. But it was evidently found that fake accounts were created to spread this mis-information. This Opened research whether this problem can be encountered or not and many researchers and technicians started to do research and there are many frameworks and research conducted in which the solution to these problem is provided .The main solution to the problem is gather evidence in reference to events or previous spoken words by the speaker . There are many Dataset available which check the news according to these previous Facts Like PolitiFact. In these paper we check how different types of news/information are available on the social media. The Different dataset that are available and we do some comparative analysis on different methods that are used among those database..

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II. TYPES OF FAKE NEWS

There are several different types of fake news available. Depending on the source, the authors and how people react to these news. They are classified onto different Types

2.1. Visual Based Fake News

Some News are falsified and certain important part of the news are photoshopped or forged to create confusion and spread mis-information on the social media. These Types of news are called visual based fake news. These types of news also include graphical representation of facts, videos , images and sometimes combination of both

2.2. Knowledge Based Fake News

The fake news issue is created in such a way that they provide scientific reason and certain important facts related to the news which cant be ignored. These Types of news are supported and mostly created by the knowledgeable and person of higher position

2.3. Post Based Fake News

These are the main types of news that are available on the social media. The post includes images, videos or any type of small article which is created to spread the mis-information and then these post are deployed in various social media platforms like facebook , twitter etc

2.4. Style Based Fake News

This types of news are mostly considered on the basis of how they are presented to the audience, also it is considered that these types of news are mostly considered to be not written by the journalist. So the way of presenting this news is very different. [2]

2.5. Stance Based Fake News

This type of news stick to particular point. To prove that point the fake arguments around that news are created. They are particularly based on how these types of news are written and how these news are presented to different medium. In many cases fake stories are created around the news

2.6. Network Based Fake News

Some post article targeted to certain type of group pf people contrary to their belief or motivation. They are specifically created to target a network and create misunderstanding among that network . These network include a political group , or certain specific organization people

2.7. User Based Fake News

Depending on the user types these news are created to target a specific type of user. Fake Accounts are created to target the specific user. These users are targeted on the basis of age, gender, type of post they like etc.[3][1]

III. DIFFERENT DATASET AVAILABLE

There are different dataset available but what is needed for the fake news detection is some quality dataset with proper information. Now these dataset are further categorize into different types and according to that we will study different Dataset.

3.1.Claims

The Dataset that contains small claims or facts related to the news are called claim based database. These claims are gathered from various articles, interviews, ads etc. PolitiFact a database which contains 221 statements along with URL, the speaker , the date is an claim based dataset. It also includes 5 point scale label. Another claim based dataset is LIAR[3][5]. The information like speaker , the job of speaker , if the speaker belongs to certain party etc are all included in these dataset . The total entries of these dataset are 12,386 statements. All these statements are further labelled with six grade truthfulness. For some short fact checking claims FEVER is used. These claims are generated from the Wikipedia. The total number of these claims are 185,445.

3.2.Entire Article Dataset

The Dataset which does prediction based on whole article i.e identify whether the whole article is fake or not are called Entire Article Dataset. FAKENEWSNET is an dataset which create prediction based on whole article[1][5]. It contains different fake articles from BuzzFeed and PolitiFact. Different social engagements of the article from social media sites like Twitter are collected in these Dataset. BS Detector is another dataset which uses whole article. These dataset is created from an extension called BS Detector. The data present in these dataset is not created by human but by the extension

3.3.Social Media Based Dataset

The Dataset based on inputs from social media is called Social Media based dataset or social networking service dataset. BuzzFeedNews[2] is one of the dataset based on social media. It I prominently takes data from nine news agencies in Facebook. The number of post collected in these news are 2282. As considering the importance of these detection system these post are fact-checked by 5 journalist from BuzzFeed. Another Dataset is SOME-LIKE-IT-HOAX. It also gathers information from Facebook. It basically contains about 15,500 post from 32 different Facebook Pages. This Dataset is based on how the identity of publisher is important and not the number of likes or dislikes on the post. Now after Facebook there are two dataset which collect data from the twitter. PHEME and CREDBANK[2]. From 9 newsworthy events 330 twitter threads are created and included in the PHEME dataset. CREDBANK however contains 60 million tweets from 1049 events . They have a 30 dimensional vector of truthfulness. But as these Datasets contain information from user or certain events created by users so these datasets are more useful in rumour detection rather than fake news detection

IV. DETECTION METHODS

There are various methods and various approaches through which the fake news detection works. As defined by authors in [1],[2],[3],[4] and [5] we study different approaches and we provide a comparative analysis of different approaches

4.1. Understanding Users Profile

As done by author in [1] this method basically divides the approach into three parts on the basis of three question

1.Which users are most likely to share the fake news?

2.How to find characteristic of the user which are likely to share fake news?

3.Can we use user profile to detect fake news?

The author tries to answer these question by applying different approaches. The Dataset used in this approach by the author is FAKENEWSNET. The author further divides the approach in three parts

4.1.1.Filtering Bot: In this approach the bot or some auto generated accounts or fake accounts are detected. This type of accounts usually called as bots are filtered using some tools like Botometer. This Botometer takes the data from Twitter and according to some extra information it gives a probability whether the account is a bot or not

4.1.2.Understanding User Profile: The user profiles in this approach are defined through various extra information that user provides during the login. This information are divided into three types implicit, explicit and all. The implicit features include :- age, personality ,location, political bias etc. For eg for determining the Location of the user LIW ie location indicative words is used in which according to how the user uses the language an predictive model is created which predicts the location of the user. Similarly different Features are found

4.1.3.Exploiting User Profiles: Whether this user profile can help create different models which can help during fake news detection is defined through this method. In this method UPF is found. UPF is user profile feature which is calculated on the basis of average feature score of all the user who shares the news. Then Different methods are compared to find the accuracy. The methods are:-

.RST :- This method works on the basis of writing style by extracting the questions which are rhetorical in nature. It transform the big words surface into informative surface.[1][3]

.LIWC :- In this the words are counted according to meaningful categories which are psychological[1][3]

.RST-UPF :- The mixture of features containing in news and user profile

.LIWC-UPF :- The mixture of features of LIWC and UPF.It was found that LIWC UPF gives the accuracy around 96%.These methods are also used by the author in [3] and it is applied on the LIAR dataset

4.2. Linguistic Approach:

The main feature of this approach is to take out main key features mostly linguistic[2]. This helps in detecting fake news. The features are:-

4.2.1.Ngrams: Some words from the story which are unigrams or bigrams are extracted and then stored as term Frequency inverse document frequency. This shows the importance of the words to the document

4.2.2Punctuation: Punctuation helps differentiate between fake and real post. This includes eleven types of punctuation

4.2.3Psycho-Linguistic Feature: To extract this the best method will be using LIWC lexicon. It mainly used to determine the tone of the language that is used in the document. LIWC categorise the cluster into single set.[2][3]

4.2.4Readability: In this extraction of chapters according to complex words, syllabus, long words, number of paragraphs etc

4.2.5Syntax: The technique is based on context free grammar where extraction is done based on these.

4.3 Deception Modeling based Models

RST and VSM are used in these technique which involves the process of clustering based on deceptive and true stories[2][5]

4.3.1 RST: RST provides a way through which clustering analysis is done on the basis of capturing the logic of a story on the basis of some relation which are functional among text units and a hierarchical structure is described for each story. It uses rhetorical connection to identify parts of text which are emphasized

4.3.2 VSM: The result set generated from RST are used to identify rhetorical structure. This is done by VSM. For various computational algorithms it requires the text to be extracted in a suitable manner. This is done by VSM by interpreting every news text as vectors of high dimensional space. The number of rhetorical question in a news set is represented by the dimension of the vector. This type of modelling is better than simple clustering analysis.

4.4. Non Neural Network Models

The author in [5] gives some supervised learning model and according to that it provides some non neural network models. The main non neural model which is used are support vector machine and Naïve bayes Classifier

4.4.1.SVM Support vector Machine:- SVM can do both classification and regression. An optimal boundary between possible outputs are found on the basis of transformation which are done by a technique called kernel trick. Certain complex transformations are created by these method which helps to categorise the data based on labels or outputs.

4.4.2.Naïve bayes classifier:- It has a common principle which states that every pairs of features which is classified is independent of each other. It is not an single algorithm but an group or family of algorithms . This all algorithms are based on Bayes Theorem

4.5 Neural Network Models

Some Neural Network Models that are used are Recurrent Neural Networks and Convolutional Neural Networks

4.5.1Recurrent Neural Networks(RNN):- Long-Short Term Memory(LSTM) are special kinds of RNN which are used to avoid the long term dependency problem. It works on long term and short term memory based on the contextual state cells . The output of these cell are generated through the cells depending upon the state of the cells. A text can be converted to LSTM where each letter can be generated based on the previously generated accounts of the letters

4.5.2.Convolutional Neural Networks(CNN):- This type of network takes an input , assosciates the input with certain importance and assigns them to certain labels or objects and differentiate the labels according to that. The main objective of these networks is to extract the high level features from the input. From the [5] it was suggested that Multi-Purpose Multi-class fake news detection framework would be developed in which CNN will be used to analyze the local pattern of the text and the LSTM will be used to analyze the dependencies and passing all the hidden outputs through a Connected Network which is full.

4.6.Article Abstraction

As created by authors in [3] these technique uses article abstraction in which the system receives input as a proposition . Then in these system its finds an article through an article finder model. Then the found article are matched through each sentence through article abstraction module. Sentence matching module and entity set module then accordingly create an answer according to input proposition. Then the last module calculates the answer and determines whether the article is fake or not. The description of each module is

.Related article finder module: It is a module that finds relevant articles from the Fact DB

.Article abstraction module: decompose each article into a collection of sentences, and express the propositions and sentences of the article as a vector of the fixed dimension by utilizing the sent2vec.

.Sentence matching module: The module constructs the input proposition and each abstracted article into input pairs and give to BiMPM

.Entity set matching module: Module that grasps the relationship between entities for the input pair consisting of the input proposition and each abstracted article

V. COMPARISON TABLE

From the methods and all the types of datasets and different parameters an comparison table is created which compares between different papers.

Table 5.1: COMPARATIVE ANALYSIS OF DIFFERENT SYSTEMS

	Title	Author	Technique	Data Set	Accuracy
1	The Role of User Profiles for Fake News Detection	Kai Shu, Xinyi Zhou Suhang Wang, Reza Zafarani, and Huan Liu	RST,LIWC and created own method called UPF	FAKENEWSNET	92%
2	Media-Rich Fake News Detection: A Survey	Shivam B. Parikh and , Pradeep K. Atrey	RST,VSM,Logistic Regression,	BuzzFeed,LIAR, PHEME ,CREDBANK	56%
3	Fake News Detection Using Machine Learning approaches: A systematic Review	Syed Ishfaq Manzoor and Dr Jimmy Singla	Rhetorical Structure and discourse analysis Network analysis approaches	LIAR	Not Mentioned
4	Fake News Detection System using Article	Kyeong-hwan Kim and Chang-sung Jeong	Sentence Matching(BiMPM), Article Abstraction and Entity Set Matching	Korean News Dataset Created using FactDB	78.2%
5	A Survey on Natural Language Processing for Fake News Detection	Ray Oshikawa , Jing Qian , William Yang Wang	Long Short Term Memory(LSTM), Convolutional Neural Network, Rhetorical Structure Theory	LIAR,FEVER AND FAKENEWSNET	60%

VI. IMPLEMENTATION

First we found the dataset from Kaggle named fake_or_real_news.csv.This Dataset had 3 attributes named Text, Title and Label. From the Dataset we took two attributes i.e Text and Label. Text Basically contains Text of the news article and Label is the labelling of that news i.e whether the news is Fake or Real.

After selecting the two attributes ie text and label we split the data into train and test dataset.For this project we decided to work on longer text as we would be using bag of words and TF-IDF for extracting features. We built our classifier after splitting the data using CountVectorizer and TfidfVectorizer. For the Tfidf Vectorizer we used the max_df argument whose max threshold was 0.7 which help us in removing most of the words which appear in more than threshold of the article. For removing English stopwords we used the built in stop_words parameter which removed stopwords before the machine made the vectors. For the Count Vectorizer we just used stop_words argument. We used both the vectorizer and we compared the result and founded that both extracted the same tokens but they have different weights.

We used PassiveAgressiveClassifer , MultinomialNb , Logistic Regression and Decision Tree. For every algorithm model we fitted and predicted both CountVectorizer and TfidfVectorizer. To compare and get the result we used confusion matrix and classification report. In Confusion Matrix top left and bottom right diagonal shows proper labels and other cells often referred as false positive or false negative. Classification report gave us precision,recall,f1-score , support and accuracy which we compared for ever algorithm.

6.1.MultinomialNb :- For Tfi-df accuracy is 86% and For Count Vectorizer it is 89%

6.2 .Logistic Regression:- For Tfi-df accuracy is 91% And for Count Vectorizer it is 91%

6.3 Decision Tree:- For Tfi-df accuracy is 80% and for Count Vectorizer is 82%

6.4 PassiveAgressive Classifier:- For Tf-idf Accuracy Is 93% and for Count Vectorizer is 89%

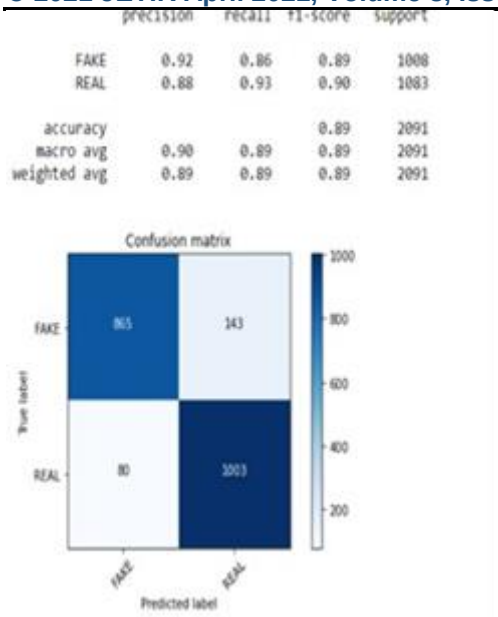

Fig 1:- . Count Vectorizer Result of PassiveAggressive Classifier

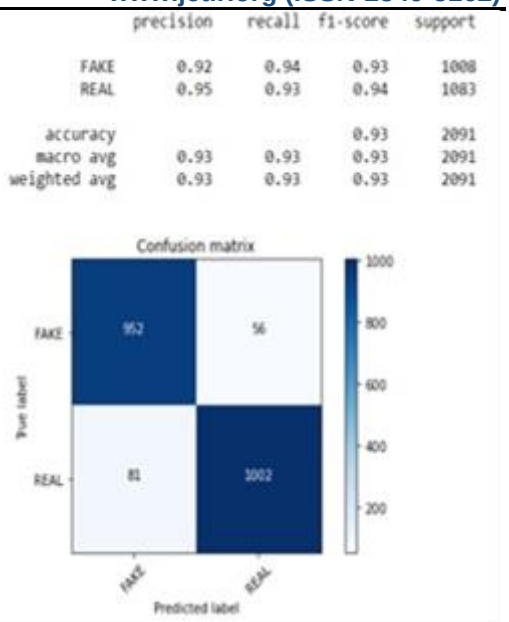

Fig 2:- Tf-idf Vectorizer Result PassiveAggressive Classifier

From the observation we found that Passive Aggressive Classifier gave us the better accuracy so we build our system by using the Passive Aggressive classifier. And from the TF-IDF and Count Vectorizer we found that TF-IDF gave us better result as it had max_df function.So we built our system using TF-IDF for Passive Aggressive Classifier. We inspected the top 30 vectors for Fake and Real News

Further Scope this system can be used for detecting accuracy of that news by providing how much percentage the news is TRUE or FALSE. This system can also uses images if provided in dataset to check whether this spreading images are fake or not

VII. CONCLUSION

From the above research we created a system which helps to determine whether the news is mis-informed or not. We studied Different Types of Dataset which are created and available for the detection system. Then we studied Different Approaches that are used by different authors and how these different methods are applied on different dataset to gather accuracy and how the system implements the detection of mis-information. So we found that different approaches can be used to detect fake news according to the types of news and we implemented from the certain approaches and made our system to detect mis-information.

From the results we found that Passive Aggressive Classifier algorithm has higher accuracy than other different algorithm which we used in the above implementation. So we used Passive Aggressive Classifier and implemented in our system.

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